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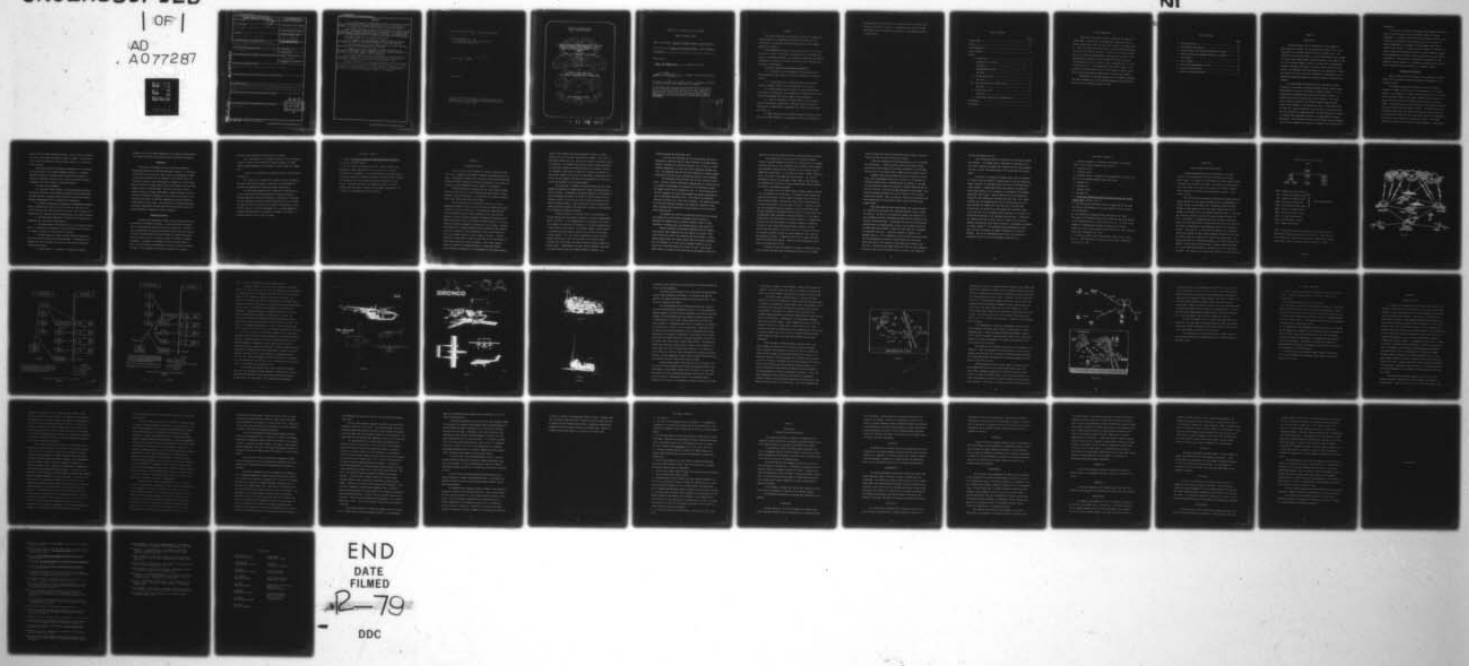

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ABSTRACT

The problem addressed in this thesis is whether the forward air control portion of the Tactical Air Control System (TACS) can be a viable force in a projected NATO-Warsaw Pact conflict given existing equipment and manning.

Areas addressed included the present TACS structure and manning, current FAC vehicles, enemy threat vulnerabilities, new techniques and tactics, communications jamming, crew training and equipment utilization. Consideration was given to the Final Report of the 1978 world-wide FAC conference recommendations.

Conclusions drawn from the research sources were:

(1) The threat is not insurmountable. Proper training and tactics application can provide a survivable environment for the fixed wing FAC.

(2) Although aging and no longer state-of-the-art, present equipment, properly utilized, can be satisfactory to do the job.

(3) Present manning can be adequate if certain restructuring of personnel is implemented. Proper management of limited resources can fill the requirements with minimum impact on other operations.

(4) Improved knowledge of all team members jobs and capabilities by other members, coupled with a hand-held computer system can enhance target identification, designation and strike to a very acceptable level.

The total integration of an effective forward air control system hinges on the understanding of the problems involved and willingness by all concerned to become flexible and innovative in the efficient use of existing equipment and personnel. Cooperation among units of the USAF and between USAF and US Army units will give the only workable solution to this problem.

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FORWARD AIR CONTROL TODAY:
WILL IT WORK IN EUROPE?

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

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B.A., Central Washington State College 1966

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MASTER OF MILITARY ART AND SCIENCE

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The opinions and conclusions expressed herein are those of the individaul student author and do not necessarily represent the views of either the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

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all concerned to become flexible and innovative in the efficient use of existing equipment and personnel. Cooperation among units of the USAF and between USAF and US Army units will give the only workable solution to this problem.

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AUTHOR INFORMATION

Major Hooyer spent three tours as a member of the Forward Air Control team. He served as a line forward air controller, and instructor while with the 25th Inf Div, CuChi, Republic of Vietnam, 1969-70. During the latter part of his tour he was the assistant operations officer of the 19 TASS at Bien Hua. He flew over 300 missions in most parts of III Corps and into Cambodia. His second tour was as a flight commander and instructor with the 702 TASS for sixteen months, and thirteen months as the 12 AF FAC/ALC, both at Bergstrom AFB, TX. Prior to attending the U. S. Army Command and General Staff College, he was assigned as Officer-in-Charge (OIC) of the Forward Air Control Tactics Branch of the Tactic Fighter Weapons Center at Nellis AFB, Nevada.

Additionally, he has been assigned as an F-4 aircraft commander and flight commander and a KC-135 Aircraft Commander and Staff Planner Briefer, both in Southeast Asia and in CONUS.

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Through the years, the use of airpower in close support of ground troops has evolved from the dropping of a hand-held bomb to the development of an aircraft solely for Close Air Support (CAS). The evolution of CAS has been steady, if at times controversial, and, throughout, there runs a common thread, forward air control. The control of CAS is, at its simplest, twofold: first, to provide timely, air-delivered munitions, on-target, and second, do it with minimum risk to friendly troops. This underlying theme has always been the requirement of forward air control, but it has never been as difficult to accomplish as in the high-threat scenario envisioned in a central European, NATO-Warsaw Pact, conflict.

The technological development and mass employment of Soviet equipment on this central European battlefield requires tactics employment different from any in the history of American warfare. U.S. Army tacticians have recognized this need and are testing, revising, and training with a tactic they call the "active defense." This tactic, which is designed around the numerically inferior friendly forces, places strong emphasis on the combined arms team. It uses flexibility, fluidity, and "combat multipliers" to get the most out of good training and best utilization of weapon systems.[1] The marked imbalance of numbers of fighting forces emphasizes the need to use <u>all</u> available resources effectively. These resources include close air support and the effective use of CAS must consider the concepts of "on-target" and "minimum risk to

friendlies."

In the past, "on-target" has normally meant engaging the selected target at a particular time with a reasonable degree of accuracy. "Reasonable. . . accuracy" varies with type of ordinance delivered, size of target, and proximity of the friendly forces, but is usually considered satisfactory if some degree of target damage occurs with no friendly forces injured. "Minimum risk to friendlies" is normally construed to mean that deliveries are planned to provide effective support with no probability of friendly injuries under any but the most unusual circumstances. This paper will investigate the capabilities of the Forward Air Control portion of the Tactical Air Control System (TACS) to provide effective close air support in the European scenario.

Statement of the Problem

Can the Forward Air Control segment of the Tactical Air Control System (TACS) as presently manned and equipped work acceptably in the European scenario?

The tactical employment of Forward Air Control as commonly employed in Vietnam is not suited to the requirements of the European scenario. In Vietnam the U.S. faced a guerilla type war, with no Forward Edge of the Battle (FEBA), little armor, normally no large numbers of enemy troops, and enjoyed air superiority and a limited air defense threat. This allowed both the strike flights and the Forward Air Controllers (FACs) almost complete freedom of tactics. The typical tactic was an airborne FAC circling the target, describing the target at length to a circling strike flight (and in the end marking with a white phospherous [WP] rocket) for the ultimate in forward air control. The European scenario most likely will enjoy none of those conditions. Enemy ground

forces will be in large numbers and moving. Any FAC, ground or airborne, will have a very lethal environment in which to perform. Strike flights will be forced into tactics offering minimum exposure to the enemy air defense systems.

This paper examines the problems and restrictions of the Forward Air Control system in the central European environment. It examines possible solutions for utilizing current personnel and equipment to attempt to determine if there is a way to provide satisfactory Forward Air Control of close air support in that environment.[2]

Six areas will be examined;

a. The present TACS structure, to identify personnel available and system limitations. Some currently identified problem areas will be discussed and what is presently being done to cope with these problems. Proposed reorganization will be considered for feasibility.

b. Current FAC vehicles for capabilities, suitability and limitations. Included will be the OV-10, the O-2, the A-37, the OH-58, the MRC 107/108 jeep, the M-113 APC, and the M-60 tank. This discussion will include tests and exercises involving variations on use of these vehicles.

c. The enemy threat capability to explore threat weaknesses and limitations for their possible exploitation.

d. The final report of the 1978 World-wide FAC conference, Nellis AFB, NV. Discussions and proposals of various suggestions for solutions to problems of Forward Air Control will be discussed.

e. Revised Forward Air Control tactical operation during unit training, Red Flag operations and other exercises. Observations of participants and their recommendations will be considered and weighed for probable effectiveness.

f. Limited aspects of 4 subtopics; communications jamming

(COMJAM), CAS strike aircraft capabilities, crew training considerations and Forward Air Control personnel training and equipment utilization.

Limitations

This thesis will address only that use of CAS Forward Air Control envisioned for the high-threat European scenario. No discussion or inference of the validity (or lack of same) in application to Korea or any other environment will be attempted. Many FACs and other CAS authorities contend a viable high-threat CAS Forward Air Control system that will work in a European scenario will work anywhere, since any other scenario would be a lesser threat. There may be validity in such a position, however, the great differences in terrain, foliage, force composition and equipment, frontages and other points would require a considerable extra amount of research, comparison and support beyond the scope desired for this thesis. The thesis uses no classified statements and remains unclassified although some classified sources were used to provide additional background for some conclusions.

Organization Pattern

To provide some perspective, Chapter II will discuss the history and evolution of Forward Air Control. The basic structure and employment of the present day TACS will be given in Chapter III. Included in this discussion will be certain related areas, such as the use of Strike Control and Reconnaissance (SCAR) and Tactical Air Controller-Airborne (TAC-A) as well as the use of various vehicles in Forward Air Control employment. Utilization of different tactics as the end results of 5 years of trial and error experimentation by field units will be covered in detail. The formulation of two and the results of one Tactics

Development and Evaluation (TD&E) test will be covered.

Some discussion will be presented in Chapter IV of attitudes and opinions of strike pilots, Forward Air Control personnel, and staff planners toward capabilities to accomplish the CAS--Forward Air Control role.

To arrive at a conclusion the following process will be followed in Chapter V.

The scenario will be examined for threat, physical limitations, and target servicing requirements. Each facet will be examined for strengths and weaknesses to determine possible exploitations.

The TACS system similarly will be examined to determine how to structure and utilize existing personnel and equipment to exploit friendly capabilities and enemy limitations. Included will be examination and comparison of various tactical applications from unit training and exercises such as Red Flag for the purpose of constructing a "sum" of "best" tactics. This total application will be played against the strengths and weaknesses of the scenario in Chapter VI to attempt to determine whether or not it could be viable.

END NOTES: CHAPTER I

1. US Army, The Tank and Mechanized Infantry Battalion Task Force, FM 71-2, 30 June 1977, Chap 5.

2. In 1977, Major Don A. Lyon, an Air Force student of the US Army Command and General Staff College wrote a thesis with the title: "The Forward Air Controller: Is He a Viable Factor in Central Europe?" Major Lyon outlines the threat and problems of a Central Europe scenario with clarity and is a good reading for another perspective of this matter. This author believes more factors have entered into this problem since Major Lyon's research and additional consideration must be given to the possibility of other solutions.

CHAPTER II

HISTORICAL EVOLUTION

One of the first uses of Forward Air Control recorded in World War I was by forward Army observation personnel using ground panels and smoke. Instances are recorded where Morse Code wireless radios were used between artillery positions and observation aircraft who would relay information to strike aircraft with hand signals or "wing-rocks."[1]

Military aviation was struggling for its very existence between World War I and World War II, and virtually nothing was done to develop Forward Air Control techniques. This developed into a pattern followed after every conflict until very recent times.

Just one year prior to US entry into World War II, the War Department authorized a series of tests which was the basis for Training Regulation 52 dated 29 August 1941. This regulation established air-ground cooperation parties (AGCPs) consisting of air corps advisors assigned to advise the ground commander on employment of tactical air.[2] These were the first of the "Air Liaison Officers" and gave us the first formalized concept of Forward Air Control as we know it today. Personnel with aircraft air to ground ordinance delivery experience were assigned to and with division and corps headquarters. This is how Forward Air Control was handled during the first 1½ years of the war. A British experiment in North Africa in March of 1943 using an air controller in a forward tank position was highly successful. This success prompted moving of controllers to forward positions to control air support. Further refinement emerged with the establishment of Air Support Parties

(ASPs) of four officers and fifteen enlisted to provide a "mobile" control force to be utilized where and when required. These units unofficially dubbed "Rover Joe", moved from one place to another to set up for operation. To supplement the Rover Joe units, limited application of the airborne Forward Air Controller (FAC) was initiated. Known as the "Horsefly", these first air FACs flew in liaison type planes not unlike those commonly used for air FAC work today. Although the use of the air FAC was limited, this action set the precedent for the role of the FAC most familiar to the military today.[3]

The development of Forward Air Control during World War II was hampered considerably by disagreement as to proper utilization of tactical air forces. Nevertheless, the general structure of air liaison to ground commanders and forward air control to provide final target information evolved to the state not too far removed from what is shown today in tactical manuals. Between World War II and the period just before the Korean conflict, little was done to improve or even practice the techniques of forward air control.

"Between September 1945 and March 1947 the United States retreated headlong from its powerful positions of military responsibility around the world."[4] With reorganization of the military, the forming of a separate Air Force and the delegation of specific responsibilities to each command, "TAC (Tactical Air Command), charged with the mission of providing close air support, became a major victim of the austere military budget."[5] The only positive step taken to update close air support training was in 1950 during a major joint exercise called "Swarmer" when jet aircraft were used to provide close air support for ground troops. Unfortunately, the units used for "Swarmer" were drawn from many diverse sources and disbanded after the exercise. Any

experience gained was effectively lost.[6]

In the face of the Korean War, the old AGCPs and ASPs were reorganized and retrained under the name of Tactical Air Control Parties (TACPs). Equipment was minimal and personnel were of varied and often unrelated backgrounds, and spent much time on temporary detached duty (TDY). FAC augmentees came TDY from pilot resources at tactical fighter squadrons with little, if any, training and almost no written guidance.

The Korean War found TACP units with old and broken down equipment. They had no higher headquarters communications net tie-in and were at a complete disadvantage for observation in the mountains of Korea. Once again, the air FAC was pressed into use. It was in Korea their use was first expanded into visual reconnaissance and target origination as well as bomb damage assessment (BDA). This provided the historical precedent for their use in these roles in Vietnam. The primary importance of the air FAC continued throughout the Korean War evidenced by their being responsible for directing over ninety percent of the CAS sorties flown during the war.[7]

The emphasis and priorities shifted after Korea and the training and equipage of the TACP nearly disappeared under the shield of Strategic Air Command (SAC) as strategic deterance became of prime importance in national policy and military matters during this era.[8]

Numerous documents and agreements addressed Close Air Support, Joint Army-Air Force Operations, and the Tactical Air Control System (TACS) between the close of the Korean War and the mid-1960s. The air request system, Direct Air Support Center (DASC) and support agreements were all finalized in the joint service agreement signed by the Air Force Chief of Staff and Army Chief of Staff in 1965. That document stands today as the basis for all direction and requirements between the

Army and Air Force for providing close air support-forward air control.

This document laid the ground work to implement President Kennedy's increased emphasis on tactical air power and its close support function, resulting in the development and procurement of new equipment, some increased training and more visability of the close air support forward air control role. In this same time period, Vietnam brought the focus on the FAC of the forward air control system. The role and importance of the air FAC was again at least equal to that of Korea. The precedents set in Korea for visual reconnaissance, target organization and BDA were rapidly reinstated.

FAC control was of two basic types in Vietnam, commonly referred to as "in-country" and "out-country." "In-country" were the FACs that controlled air assets for close support of friendly troops in the confines of South Vietnam. This role was very close to that described in Air Force Manual (AFM) 2-7 as the duties of a FAC.[9] It should be noted that this description does not describe the type of FAC vehicle used, although Tactical Air Controller-Airborne (TAC-A) and Strike Control and Reconnaissance (SCAR) described in the same reference do. This may be intentional to give flexibility in choice of vehicles. In Vietnam these air FACs could fly their mission with relative immunity to enemy air defenses by their current and mostly accurate knowledge of the air defense they were likely to encounter. Each of the threats, from small arms through the large AA guns, have known ranges and their locations were usually well known. Avoidance was easy; stay outside their capabilities by altitude and offset. Except for new gun locations, the AA threat was fairly easy to avoid.

"Out-country" FACs flew missions in support of interdiction type strike sorties providing target information and marking on the supply

routes and caches for the most part outside South Vietnam. These out-country FACs fit the AFM 2-7 definition of SCARs.

There were exceptions to both definitions given of "in-country" and "out-country." Notable exceptions would include remote supply routes inside South Vietnam hit by sorties controlled by "out-country" FACs and most of the support flown in Cambodia by "in-country" FACs.[10]

Parallel roles that developed from Vietnam included the strike control and reconnaissance (SCAR) and a variation on the Tactical Air Controller-Airborne (TAC-A) (commonly called the FAST FAC). The SCAR role was performed in areas not occupied by friendly troops and was the use of an "Air FAC" to control and mark interdiction type targets. This role was commonly performed on one of the "trails" in Laos or north-western South Vietnam. Since the enemy air defense here was heavier and more sophisticated, the SCAR tactics relied on more altitude and/or further offset.

Other areas that had heavy enemy defenses were often controlled by a variation of the Tactical Air Controller-Airborne (TAC-A), called the FAST FAC. The TAC-A is by definition a Forward Air Controller in a high performance aircraft controlling tactical close air support in the vicinity of friendly troops. In southeast Asia this role was frequently performed where no friendlies were a factor, thus becoming a SCAR role. One area where they performed in their more true sense was in Cambodia. F-4 aircraft[11] were used to provide FAC control in support of the Cambodian forces. It is interesting to note that very few of these crews had any background as a FAC and no formal training for the mission except that given in the squadron by crews previously working in the SCAR role. This control was always called the "FAST FAC" and considered by most to cover the role defined in AFM 3-1 as TAC-A, even though the

crew was not trained as a FAC.

After Vietnam the mission of Forward Air Control again received less emphasis. The probable area of employment was perceived as the high threat European NATO-Warsaw Pact scenario--one that many observers felt was not within the capabilities of the TACS--Forward Air Control System.

In 1973 the 507 Tactical Air Support Group (later 507 Tactical Air Control Wing) was alerted to provide forces to man the forward air control portion of a contingency force to be sent to the Middle East in a real conflict. Although that force never deployed, the personnel alerted gave impetus to the development of new tactics for use against Warsaw Pact type threats. Numerous tactics have been developed and utilized in unit training and exercises since that time. Most experimentation was done independently at each of the two wings of the US based Tactical Air Command (507 TACW, Shaw AFB, SC and 602 TACW, Bergstrom AFB, TX) as well as in the European and the Pacific units. In 1977 and early 1978, successful efforts were made to consolidate the information and results of the individual unit findings. A World-wide FAC conference was held at Nellis AFB, NV in March of 1978 to bring together the people and their ideas to attempt to consolidate all Forward Air Control efforts.[12] The conclusions and recommendations of that group were sent to Tactical Air Command headquarters for study and staffing. Some of the recommendations have since been published as techniques in AFM 2-1 and in Multi-Command Manual (MCM) 3-1.

END NOTES: CHAPTER II

1. Dougherty, Charles R., "History of the Forward Air Controller (USAF)", Air University Library, April, 1970, 4.

2. Dougherty, 12-13.

3. Dougherty, 13-14.

4. Goldberg, Alfred, "A History of the United States Air Force, 1907-1957", Air War College Research Report, 1957, 105.

5. Dougherty, 23.

6. Goldberg, 140.

7. Goldberg, 29-32.

8. Goldberg, 34.

9. US Air Force, Tactical Air Force Operations-Tactical Air Control System (TACS), AFM 2-7, 2 Feb 79.

10. There are several books that cover the Vietnam War FAC and other FAC history, but Dougherty's is the most complete and to my opinion the most accurate.

11. The SCAR/FAST FAC aircraft history goes back to the "Misty" FACs using F-100-F aircraft early in the Vietnam War and has a parallel in the Navy/Marine TF-9-J's, F-8's, and A-4's. See: "A Study of Fast Forward Air Controller and Tactical Air Coordinator (Airborne) Operations, 1969 to 1973", Applied Sciences Department, Naval Ammunition Depot, Crane, Indiana, 26 Nov 1974.

12. FAC Tactics Branch, USAF Tactical Fighter Weapons Center, Nellis AFB, NV. "1978 World-wide FAC Conference Final Report" USAFTFWC/TA, Nellis AFB, NV, 1978.

CHAPTER III

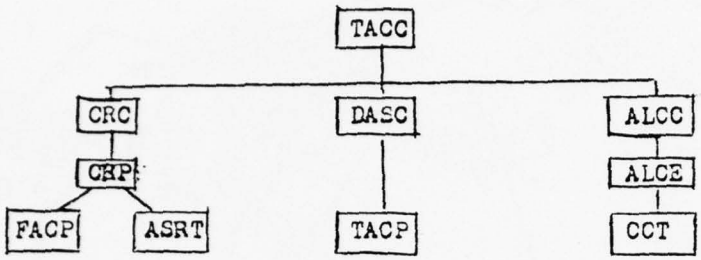
TACS AND FORWARD AIR CONTROL TODAY

Overall responsibility for providing effective close air support to the ground forces rests with the Tactical Air Control System (TACS). It is made up of the Tactical Air Control Center (TACC), the Command and Reporting Center (CRC), the Command and Reporting Post (CRP), the Forward Air Control Posts (FACPs), the Direct Air Support Center (DASC) and the Tactical Air Control Parties (TACPs). (See Figures 1 and 2)

The TACS functions by accepting and processing immediate and preplanned requests for air support (tactical strikes, reconnaissance, or airlift) through two requesting nets. Preplanned requests are sent through the Army request net and moved upward through each level of command to the highest level Army Tactical Operations Center. There they are evaluated, assigned a priority and ordered executed through the TACC. (See Figure 3) Immediate requests are monitored by all TACPs higher than the requester and go through the DASC to the TACC where they are filled by communication with appropriate aircraft unit operations centers. (See Figure 4) At this point both immediate and preplanned missions are handled the same, except preplanned sorties have more lead time before launch and usually know at least their target area. The launched aircraft are directed and monitored by the CRC or CRP and FACP radars to their respective mission areas. Strike aircraft are turned over to the appropriate Forward Air Controller (FAC) for final strike direction. This portion of the system that involves the FAC and the TACP

THE TACTICAL AIR CONTROL SYSTEM

(TACS)



TACC: Tactical Air Control Center

CRC: Command and Reporting Center

CRP: Command and Reporting Post

FACP: Forward Air Control Post

ASRT: Air Surveilance Radar Team

} Radar Oriented Units

DASC: Direct Air Support Center

TACP: Tactical Air Control Party

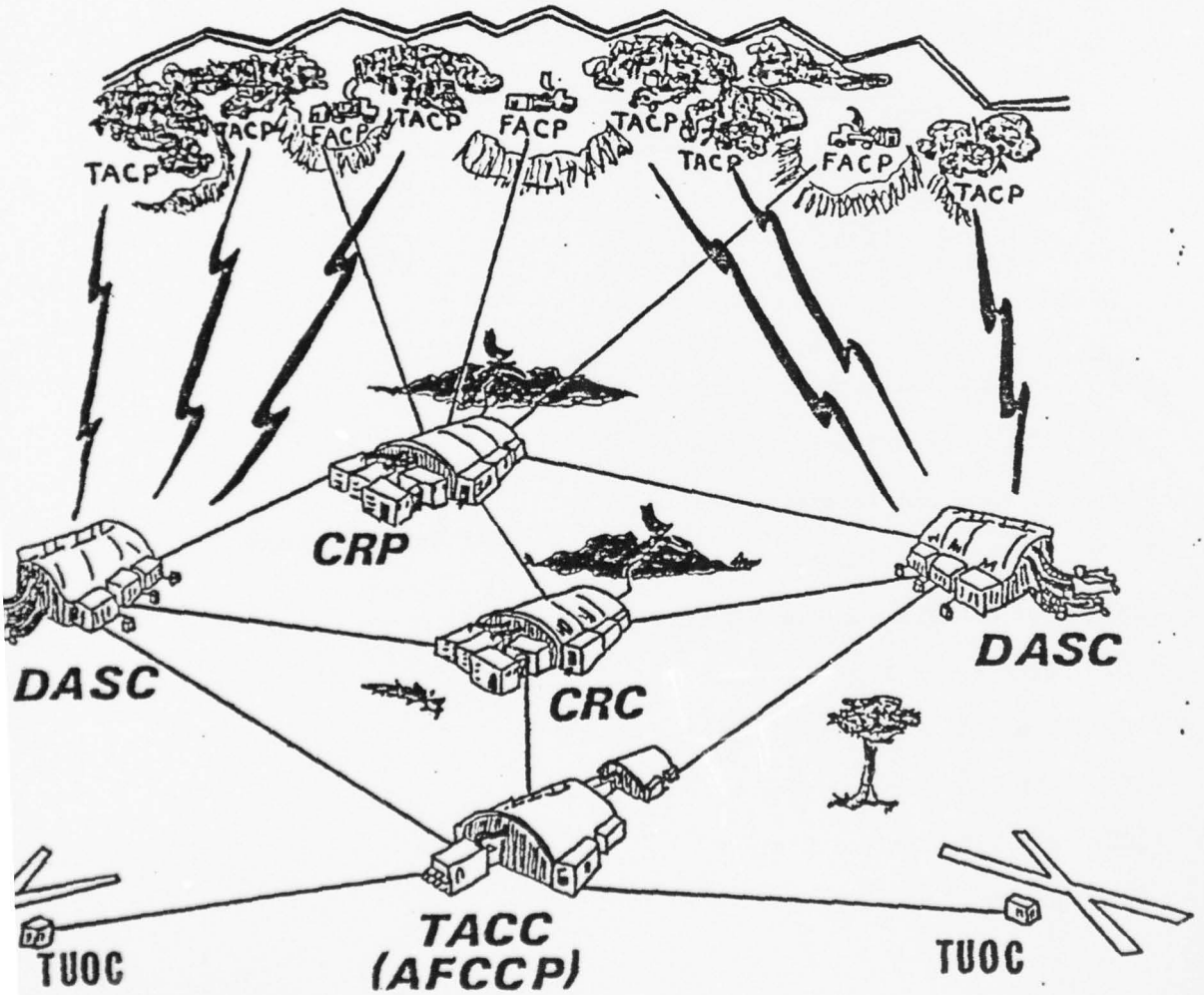
ALCC: Air Lift Control Center

ALCE: Air Lift Control Element

CCT: Combat Control Team

NOTE: The ALCC, ALCE, and CCT are airlift only functions and the ASRT concerns bombing using ground radar control. These units and their function are outside the scope of this thesis and are illustrated only to show the complete block structure of the TACS.

Figure 1


TACP
TACP
FACP
TACP
FACP
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TACP
FACP
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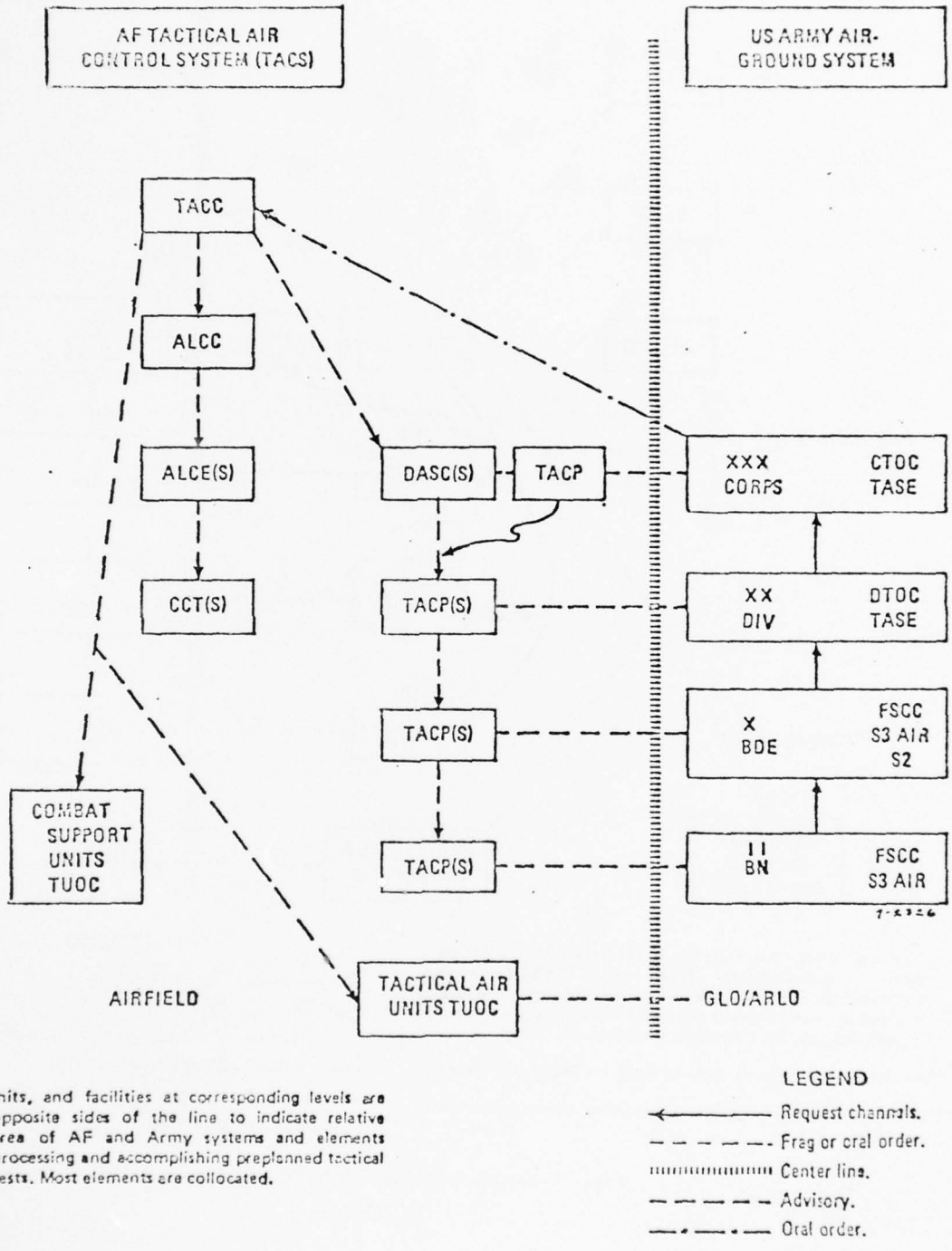
CRP
DASC
DASC
CRC
TACC
(AFCCP)
TUOC
TUOC

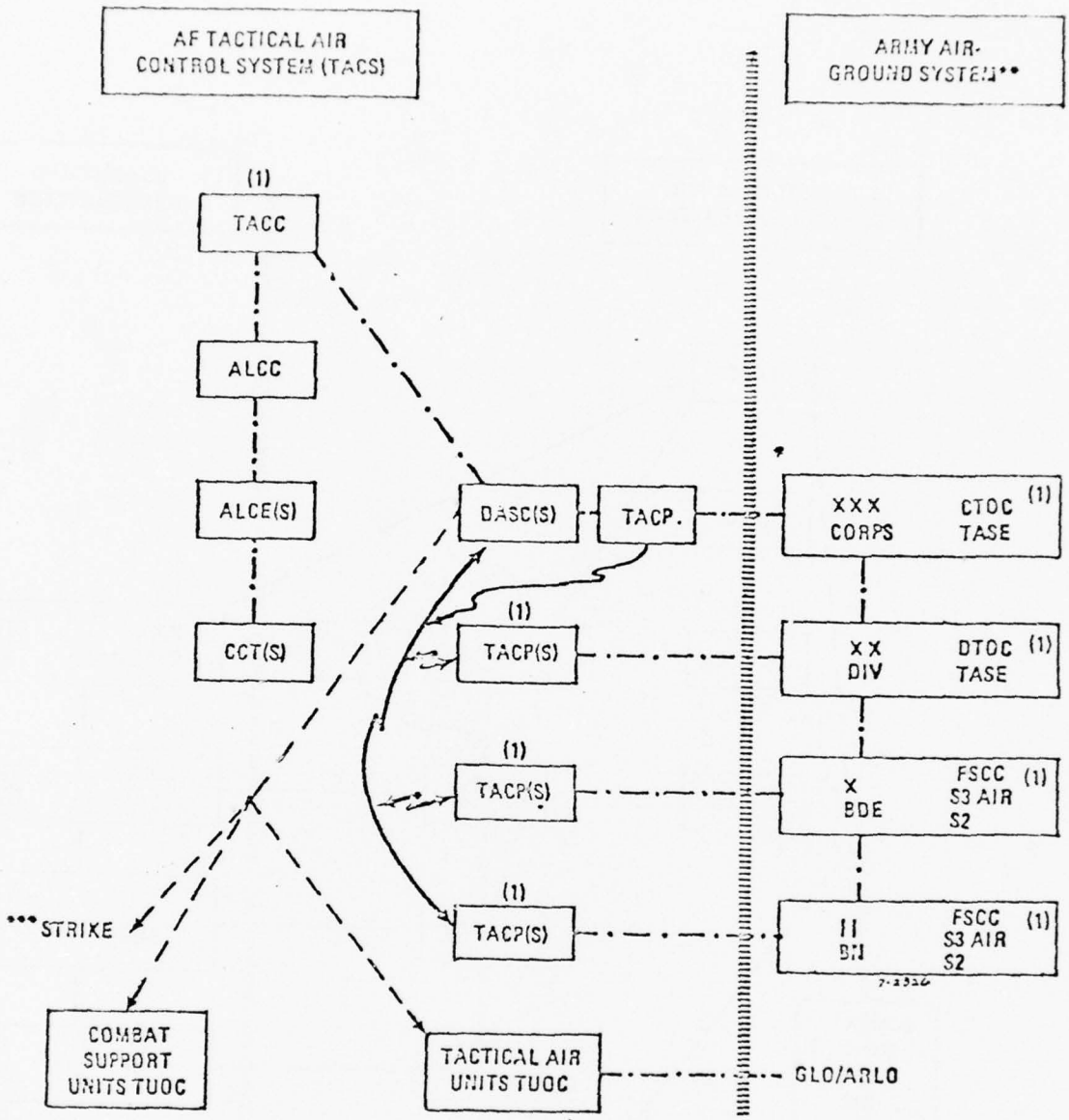
FIGURE 2



Elements, units, and facilities at corresponding levels are shown on opposite sides of the line to indicate relative functional area of AF and Army systems and elements involved in processing and accomplishing preplanned tactical support requests. Most elements are collocated.

Request channels for preplanned tactical air support (TAS).

FIGURE 3



*Elements, units, and facilities at corresponding levels are shown on opposite sides of the line to indicate relative functional area of AF and Army systems and elements involved in processing and accomplishing immediate tactical support requests. Most elements are collocated.

**An immediate request can be initiated at Army level.

***When necessary and available, airborne aircraft may be employed.

LEGEND

- Request channels.
- AF Air request net.
- (1) Monitors or initiates immediate requests.
- Coordination.
- Center line.
- Oral order.

Request channels for immediate tactical air support (TAS).

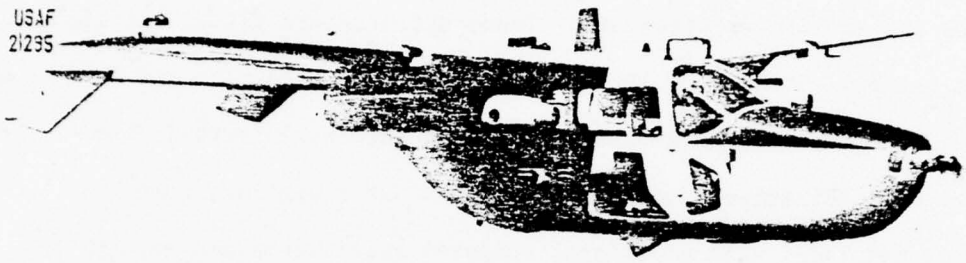
FIGURE 4

system is where the Forward Air Control questions arise.

Typically, Forward Air Control systems organized in accordance with AFM 2-7 have TACPs at each level of Army organization from battalion up through division. The battalion TACP will consist of two FACs and at least two Radio Operators, Maintainers and Drivers (ROMADS). The brigade TACP will have four officers responsible for CAS strike, reconnaissance and airlife requirements. These officers are titled air liaison officers (ALOs). The senior ALO and the fighter ALO are also FAC qualified. A proportional amount of enlisted personnel serve in the ROMAD and administrative functions. Division has a similar, more heavily manned TACP, with additional enlisted maintenance and supply specialists to support the specialized equipment of all the TACPs. The DASC is the operations clearinghouse for all Air Force tactical operations in support of the divisions and is normally co-located with the Corps TOC. Neither the TACC nor the DASC remain located with the Army during peacetime in the conus, although they sometimes are co-located with units overseas. Battalion TACPs are not manned in peacetime, except for the Ranger battalions. Personnel resources to man the FAC positions at battalion level are in garrison at Tactical Air Support Squadrons (TASSs), maintaining FAC capability and flying proficiency in Forward Air Control aircraft (O-2s and OV-10s). These aircraft, and specially equipped M-151 1/4 ton vehicles (designated MRC-107 and MRC-108) are the organic Air Force vehicles used by the FAC or ALO to move within or to the battle area to be controlled. (See Figures 5, 6, 7)

The FAC also uses special purpose army vehicles as authorized under the 1965 Interservice Support Agreement. Depending on the unit to which they are assigned and the mission, FACs may use M113 personnel carriers or M60, or other tanks. More recently light observation

O-2A



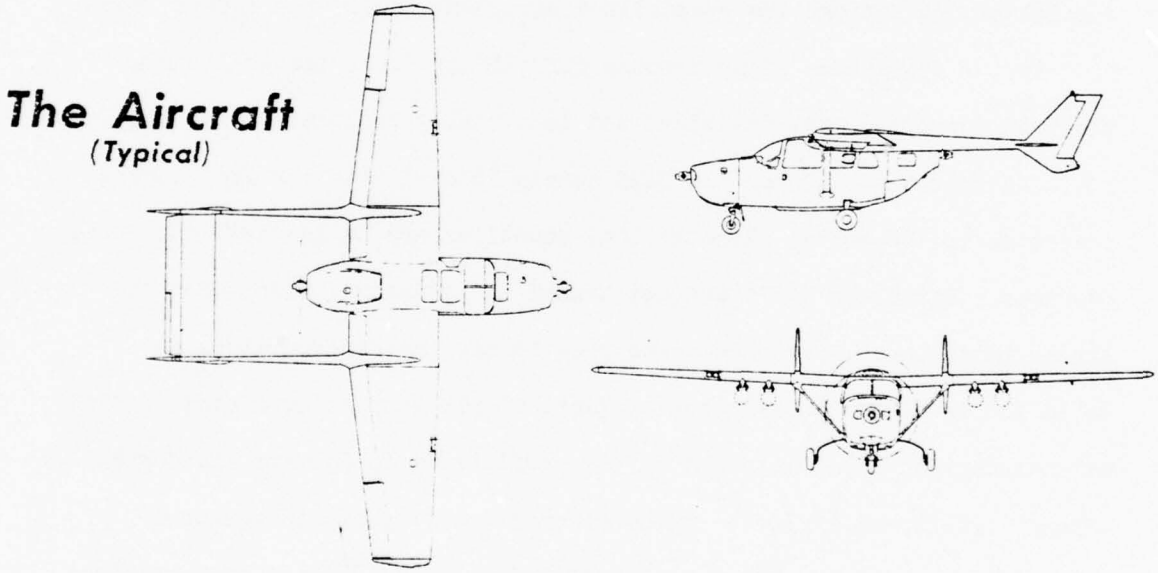
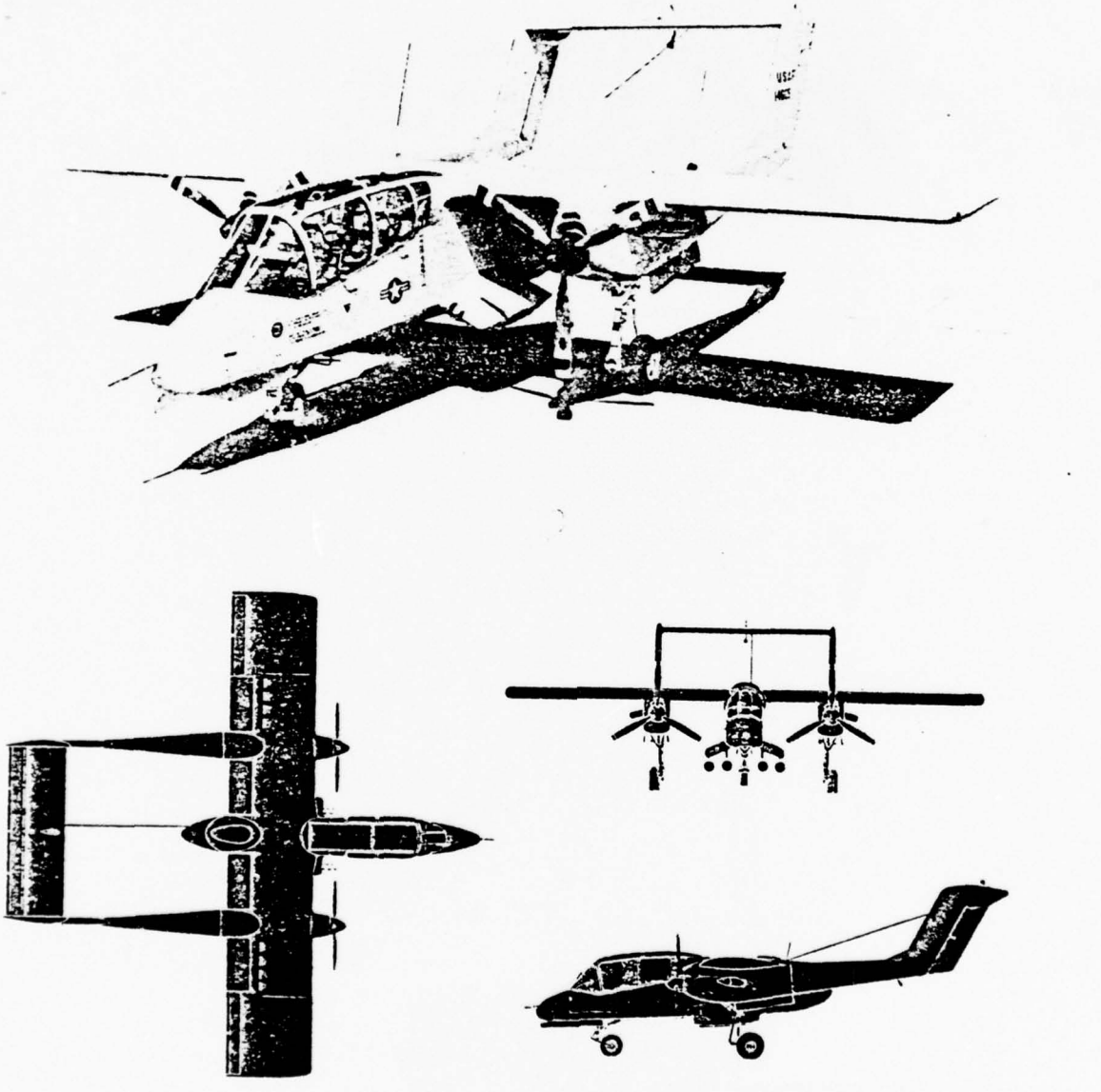


FIGURE 5

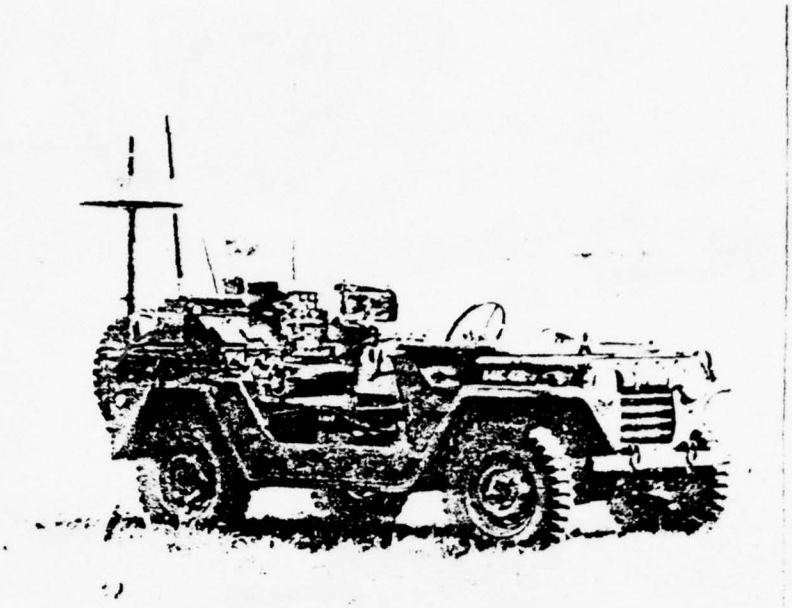
OV-10A

BRONCO

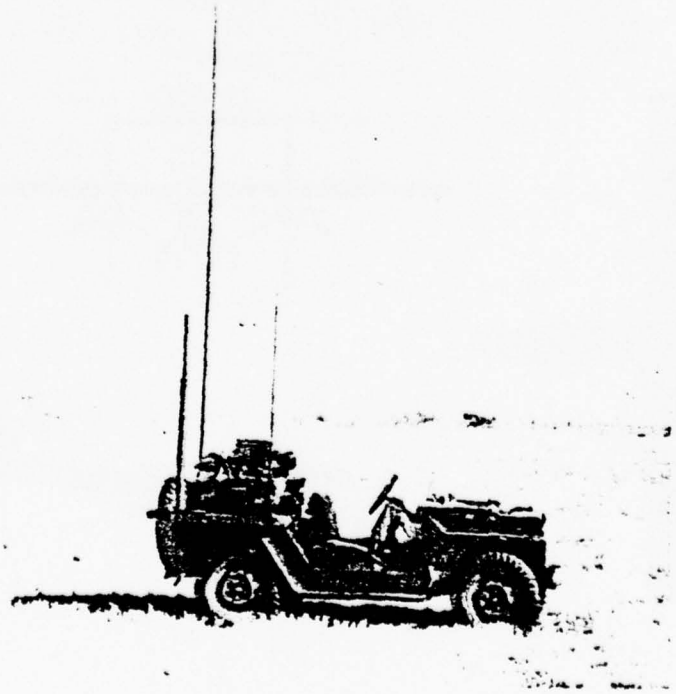


VA-1-3A

Figure 6



MRC-107



MRC-108

FIGURE 7

helicopters (LOHs) piloted by army aviators have been made available for use by Air Force personnel.

Postulating TACS employment in the high threat European scenario brings several problems to the surface. The problem area that has achieved the highest visibility involves the use of an air FAC. It is here this discussion will begin.

The Soviet-Warsaw Pact Air Defense Artillery (ADA) system is the most sophisticated and formidable on earth. In a fully dispersed, engaged scenario, the area over any proposed FEBA is covered by ZSU-23-4 through 57 MM anti-aircraft guns, and through the missile gamut from the hand fired SA-7 to the SA-2, including the SA-9, SA-7, and SA-6 mobile missiles. No exposed altitude within the capability of existing FAC fixed wing air vehicles is even remotely safe. Remaining well to the rear forces fixed wing aircraft to such low altitudes that visual observation of the target is impossible. The air FAC, forced to altitudes below one hundred feet, five to fifteen kilometers to the rear of the target area, cannot provide visual strike control. These same ADA threats have forced the strike flights to adopt a tactic requiring low level ingress to a point in fairly close proximity to the target and then a pullup (or "pop") for target acquisition and subsequent minitions delivery. Precise navigation to point targets becomes difficult and pop up for target acquisition and strike becomes critical.

The most precise target information (and the most timely) is at the source; the army commander involved and his assigned battalion FAC. Unfortunately, strike flight tactics (low level ingress to a pop), and the presence of enemy communications jamming, severely limit the range of the FAC radios. Consequently, little or no information can be transmitted more than 5 to 8 kilometers, too short a distance to be used

in computing or changing a run-in heading. Without current target information, the strike flight has little or no chance of acquiring and hitting the correct target, especially if the battle is at all mobile.

Since 1973, various methods, means, and tactics have been employed by units of the Forward Air Control portion of the TACS system to attempt to overcome these problem areas. Some units attempted to use the ground FAC as the sole controller and information source for the strike flight. (See Figure 8) Limited success was achieved when favorable terrain permitted line-of-sight communications between the FAC and the strike flights. Unfortunately, the communications jamming problem was initially ignored. Later, attempts were made to relay information from FACs at forward TACPs to TACPs further to the rear. Continuity of ideas, the requirement to use multiple radios, and the need to transfer control from TACP to TACP as the strike flight progressed forward toward the target, made that idea extremely unwieldly and unworkable.[1]

Other problems of providing accurate targeting data to the strike flights to acquire and hit the target were also identified. Strike crews had little training in flying low level to a precise pop point, achieving target acquisition and making strike decisions in a matter of seconds.[2] The Vietnam years, and the period after, provided an inertia in tactics development that saw little practice in low level flying, with virtually none during Close Air Support missions. Extensive revamping of strike flight CAS training including emphasis on low level navigation and target acquisition was required. Still, only three operational strike aircraft have sufficiently sophisticated computer systems to provide accurate target acquisition data given only target coordinates; the A-7, F-4 and F-111. Also, most targeting data

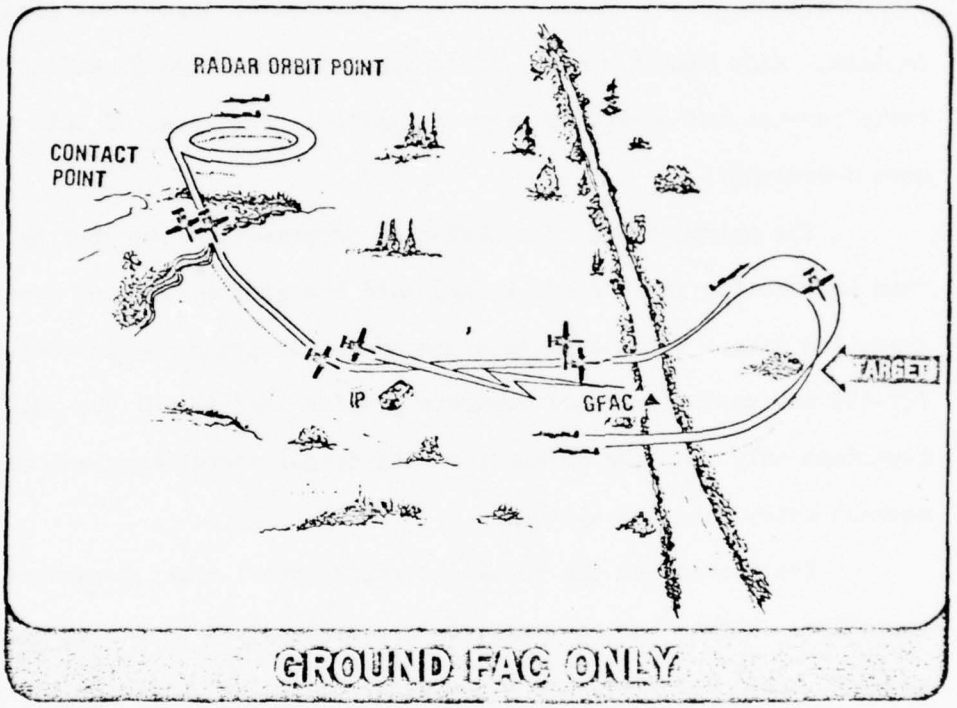


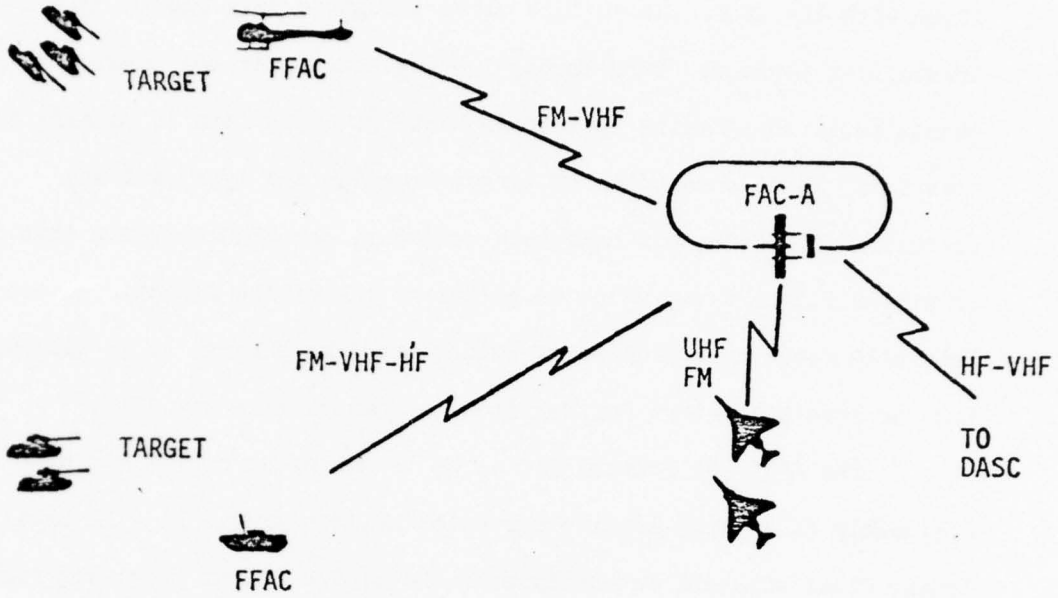
FIGURE 8

coordinates are given in Universal Transverse Mercator (UTM), rather than latitude and longitude coordinates used by aircraft computers and pilots. Clearly, a central figure was needed to translate all target information into usable data for the strike pilot. Logically, the FACs should fill this role.[3] Run-in data was computed using run-in courses, times, and distances from given prominent landmarks, but many targets still were never seen or too widely offset from the run-in heading to be hit. Strike flight pilots blamed FACs for imprecise or inaccurate target run-in data. FACs blamed strike pilots for imprecise flying skills, too early pop-ups and generally poor navigation. Instances of both failures were documented.

The introduction of a hand-held programmable computer by FACs from the Pacific Air Forces (PACAF) laid the ground work for precise targeting data. A Texas Instruments hand-held programmable computer (TI-59) was used to provide accurate precise ingress and pop point data, dependent only upon the accuracy of the target coordinates and their correct entry into the system.[4]

The success of the resultant strike profile was dependent on two variables: First, the accuracy of the strike pilot in flying correct heading, speed and time, and his ability to actually acquire the target in the pop; and second, the accuracy of the target coordinates inserted into the computer by the FAC.

Another problem was how to transmit target information from the army commander and his FAC to the strike flight early enough to be usable, while retaining a capability to correct the data for target movement or danger to friendly troops. Use of the air FAC (AFAC) as a mobile relay between the ground FAC (GFAC) and the strike flight proved most successful. (See Figure 9) The AFAC receives the target data from


TARGET
FFAC
FM-VHF
FAC-A
FM-VHF-HF
UHF
FM
HF-VHF
TO
DASC
TARGET
FFAC

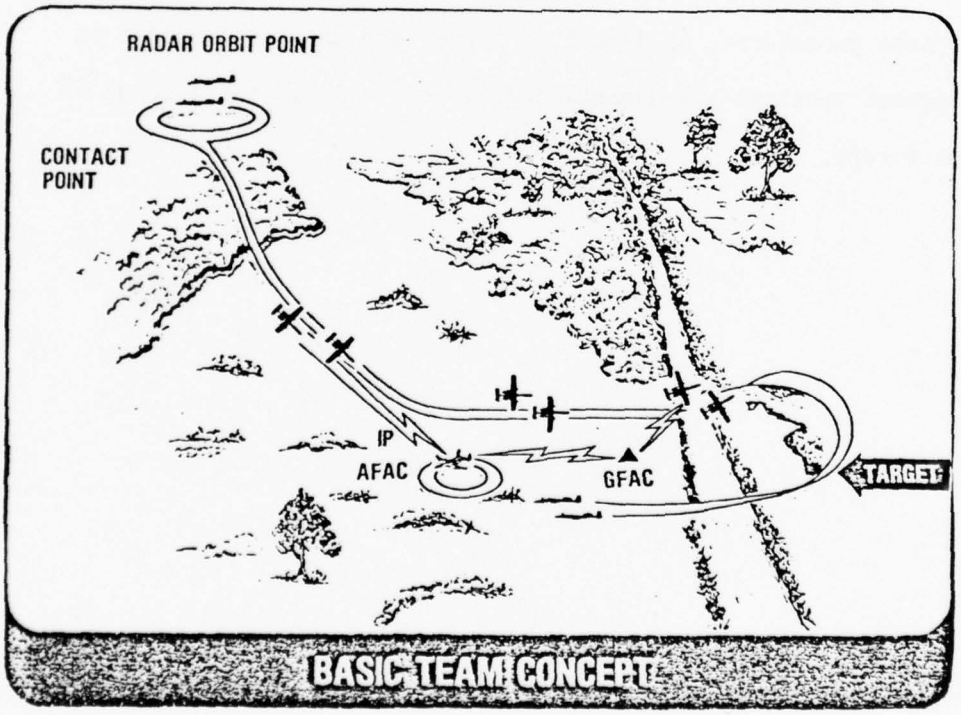

RADAR ORBIT POINT
CONTACT
POINT
IP
AFAC
GFAC
TARGET
BASIC TEAM CONCEPT

Figure 9

the GFAC by moving in at low altitude to a point where he has line-of-sight with the GFAC. He must be close enough to have enough relative transmitter power to "burn-through" enemy communications jamming if he cannot avoid the jamming by terrain masking. This data is usually in a "raw data" form, consisting of target location and type, and any restrictions. Using his hand-held computer, the AFAC converts this data to strike flight data, which he relays to the strike flight. He can do this with fewer communications jamming problems because he is already five or more kilometers further from the jammer than the GFAC.

The GFAC (or Forward FAC as he is now often called since he is frequently in an Army light observation helicopter [LOH]) will usually retain final withhold authority over the strike flight by giving final roll-in corrections or an abort call if required.

These procedures, as described above, are the basic system in use throughout Tactical Air Command today, and to a limited degree, in PACAF and Europe.

END NOTES: CHAPTER III

1. Multiple telephone conversations with Captains; Wayne F. Conroy and Patrick J. Burke, FAC Tactics Branch, USAF TWFC, Nellis AFB, NV, November 1978.

2. Red Flag final reports, 1976, 1977, and 1978.

NOTE: Red Flag is an Air Force exercise held in recurring 4 week cycles year round at Nellis AFB, NV and on the Nellis Range Complex. Representative units of a strike task force plan and execute variations to an air support plan including all the various facets of a European scenario from the air point of view. The reports are classified but the extracted conclusions used in this paper are not.

3. The statements in this paragraph and many statements used to the end of this chapter were obtained in many conversations with the members of the FAC Tactics Branch, USAF TFWC, Nellis AFB, NV, FACs and fighter pilots of the units who participated in Red Flags and local training using these techniques. Additionally the author has observed and participated in exercises and training from 1975 through 1978 involving the implementation of these techniques.

4. FAC Tactics Branch, USAF Tactical Fighter Weapons Center, Nellis AFB, NV, "1978 World-wide FAC Conference Final Report", USAFTFWC/TA, Nellis AFB, NV, 1978.

CHAPTER IV

SYSTEM PROS & CONS

To examine the viability of the system two definitions must be evaluated, control and risk to friendlies. In the past, "control" was defined as a FAC visual contact with the strike aircraft and the target prior to release of any ordinance. Additionally, if friendly forces were nearby, it meant no strike aircraft overflight of friendly forces during ingress or egress, positive visual identification by all strike flight members prior to ordinance drop, and a very low probability of friendly losses from friendly air delivered ordinance. Those definitions, and the rules that evolved from them, were a direct result of the environment of Vietnam. The threat, and the type of battle fought in Vietnam, made them quite usable. A European, NATO-Warsaw Pact, conflict must impose a slightly different definition. Control of CAS must become, of necessity, the best and most precise targeting information and restrictions possible, commensurate with the battle situation. Friendly losses due friendly air delivered ordinance will, by every means humanly possible be avoided. However, risks of that nature are inherent with such a scenario, and will be weighed against the possible losses incurred in <u>not</u> using close air support. Further examination of the current employment of the Forward Air Control portion of the TACS will follow.

The most prevalent argument against use of an air FAC in a European scenario is that he cannot survive against the enemy air defense threat. Major Don Lyon, in his 1977 AMAS thesis titled: "The

Forward Air Controller: Is He A Viable Factor in Central Europe?" addressed the Soviet threat in detail. His comments on the viability and capability of the air FAC, however, are based on a requirement for the AFAC to fly over or near the target at the FEBA. Although discussed in his thesis, the tactic of keeping the AFAC at low altitude and displaced from the FEBA was not widely used, and even less known, at the time Major Lyon's thesis was written. He states that this tactic is difficult to accomplish under even training conditions and implies that it may not prove to be usable.[1]

The Studies and Analysis (SA) section of the Tactical Fighter Weapons Center (TFWC), Nellis Air Force Base, NV, completed a computer study in late 1977 of enemy ADA emplacement and probable employment. A one-for-one representation of enemy air defense systems was placed according to enemy doctrine and logical employment on a representative section of central Europe. Except for assuming the terrain to be devoid of vegetation and all systems 100% operational and capable, all other factors approximated realistic deployment. The object of this study was to look for areas of "relative safety" from enemy radar threats created by terrain masking and equipment placement. Both terrain mask shadow areas and equipment range capability were plotted. It was determined, by using intelligence data of known enemy ADA positions and probable placement of unknown systems, an area below 100 feet and to within 5 to 8 kilometers of the FEBA could be transversed with much lessened chance of acquisition by the enemy threat systems. This area would also be outside the range of all ADA gun systems on the FEBA. Air FAC resources could reposition themselves according to known and estimated enemy ADA positions (supplemented by on-board radar detection equipment) to optimize radio communication with the Forward FAC

considering terrain masking and burn-through capability for communications jamming.[2]

Tactics exploiting this data were utilized with varying success in various Red Flag exercises at Nellis AFB, NV in 1977 and 1978. FAC Tactics Branch personnel (TFWC, Nellis AFB) participated and observed every CAS Red Flag, from its inception, and offered the following observation. "Success and failure rates for communications jamming defeat and threat avoidance were inconclusive on surface examinations".[3] Closer scrutiny indicates reluctance of personnel to try the new tactics and reversion to old tactics upon single failures. Personnel who persisted in pursuing proper use of the tactics had excellent successes, exceeding 75% to 80%. Pilots unfamiliar with visualizing ways to improve their line-of-sight for communications or utilizing terrain masking for threat avoidance, were responsible for many early problems. A strong disbelief in the capability of the tactic to provide threat avoidance and communications jamming relief was also evident. Additionally, other phases of the tactical problem detracted from concentration on proper positioning. FACs became overly involved with target identification and deviated from prescribed parameters.[5]

Another area that requires examination is the use of target marking. Target marking is traditionally done by firing a WP rocket from the FAC aircraft to the target, providing the strike pilot with an excellent target reference. Other means of marking include artillery placed WP on the target and marking of the Ground (or Forward) FAC position. In the European scenario, artillery will be at a premium and probably will not be available for marking. Revealing friendly positions by use of a smoke mark for identification may not be wise. Traditional fixed wing marking rockets are fired nose low from an

altitude and at a slant range, usually well within enemy ADA range. Techniques have been developed to deliver smoke rockets from fixed wing aircraft from low altitudes in a nose high attitude. Ranges from four to five miles are typical with accuracies by practiced proficient personnel within 500 feet consistently possible.

The use of the hand-held computor during training and exercises has been implemented both in PACAF and in Tactical Air Command. Early mixed successes were again attributed to distrust of the systems by both the FACs and the strike flights. Once again, those personnel who were practiced in the use of the system, and willing to pursue its employment, were able to obtain results with similar 75 to 80% success rates.[6]

During the last 3 years, the problem of insufficient pilots to fill authorized FAC and ALO positions has led several units to experiment with a slightly different utilization policy for their FAC personnel.

Since 2 FACs frequently cannot be assigned to all battalions, all FAC personnel assigned to brigade and lower echelons are retained at the brigade, and dispatched to selected units in need of air support. This decision is made by the brigade commander, with advice and concurrence of the brigade senior ALO. These FACs are dispatched by the most practical means, but usually by army LOH with an army pilot. This arrangement, due to rapid response, existing radio communications equipment in the LOH, and proven nap of the earth (NOE) tactics, provides survivability and the flexibility to divert to other areas. By pooling the limited FAC resources and centrally controlling their dispatch from the brigade, the air control requirements can be covered in the most expeditious manner. This method of personnel utilization is

also compatable with the use of the AFAC in the previously discussed relay role.[7]

The Air Force presently employs two aircraft, and has actively evaluated a third, in the AFAC role. The Cessna-produced O-2 and the Rockwell International produced OV-10 are the two aircraft presently in the active force, and with the reserve forces, as the AFAC vehicle. The Cessna produced A-37 has also been examined and tested in the AFAC role.

All three aircraft are of older design, and adapted from a different role to the AFAC role. The O-2 and OV-10 saw considerable service in Southeast Asia as FAC aircraft and earned a commendable position in aviation history for their performance. The technical aspects of each, although possibly of some interest, are of only relative value and will not be pursued here.[8] The O-2 and OV-10 have good-to-excellent visability, maneuverability and endurance. They can be serviced and maintained at a fairly spartan forward location, if major repair facilities are available at a more sophisticated location. Both have a good variety of radio equipment to interface with required agencies. Only the OV-10's deployed outside the CONUS have Radar Homing and Warning (RHAW) receivers for detection of enemy anti-air radars. Neither the O-2 nor the OV-10 has much zoom[9] capability. Both are poor to marginal in single engine capability, the O-2 having no single engine capability in a large portion of the operating temperature/pressure-altitude spectrum. Only the OV-10 has ejection seats for the occupants. Neither has any appreciable dash capability to exit areas of unacceptable threat. The O-2 uses aviation fuel which can be difficult to procure.

The A-37 was evaluated in Vietnam for possible use as a FAC aircraft in 1968 during a test called Combat Dragon.[10] It was evaluated

again by the Tactical Fighter Weapons Center, Nellis AFB, NV in 1976 using stand-off tactics.

In the first evaluation, the conclusion was that, although usable, the requirement to visually acquire targets using Vietnam/Southeast Asia tactics limited the plane's usefulness, due to restricted visibility produced by the low wing. Conversely, in the 1976 evaluation, using stand-off low level tactics, pilot participants determined that visibility restrictions were not limiting factors. The aircraft performed well in the low altitude stand-off role, with the only real limitation being fuel endurance. The A-37 does not easily adapt to operations from forward locations due to poor ground clearance and high susceptability to foreign object damage (FOD) from ground debris.

The OH-58, which is fairly representative of all US Army LOH aircraft provides a small plane form, and is highly maneuverable very close to the ground. It can be equipped easily with a wide range of communications gear, and is able to be based and serviced with virtually any unit.

The MRC-107 and MRC-108 communications vehicles contain the complete spectrum of required communications radios. The vehicle is a modified M-151 1/4 ton jeep, with many common parts available through army supply channels.

The communications equipment presently deployed on all ground FAC vehicles is aging and far from state-of-the art. These vehicles cannot keep pace with any tracked unit on any terrain other than roads or open fields. The M-113 personnel carrier and the M-60 tank provide excellent compatability with similarly equipped units but considerably restrict the FAC's versatility. Presently, no universal quick mount equipment is available to speedily transfer the communications gear from

a MRC-107 or MRC-108 to the respective tracked vehicles. European based Army units have worked with FACs in tracked vehicles for some time, and as recently as 1975 dedicated great effort to operating communications packages and FACs in tracked vehicles on a regular basis. However, no universal quick change package is available, as of April, 1979.

END NOTES: CHAPTER IV

1. Lyon page 38.

2. The report on this computer study is classified. An unclassified discussion of its results were briefed at the 1978 World-wide FAC Conference and a summary of that briefing can be found in its Final Report, page 6.

3. The Red Flag reports for this time frame gave conflicting and incomplete data. Interviews with participants who were unsuccessful revealed little correlation between use of these tactics and lack of success. See Also; "Cleared Hot!" TAC Attack Vol 18 No. 8, August 1978, 3-6.

4. Although no written data were collected for these missions, FAC Tactics Branch personnel who observed and participated estimated this success rate.

5. Few Red Flag missions run on the Nellis northern tactical ranges have GFACs, which forces the AFAC to move much further into the enemy air defense envelope which is unrealistic.

6. Opinion of the users, PACAF developers and FAC Tactic Branch personnel.

7. "FAC Conference Final Report", 39-41.

8. Technical aspects of the aircraft and other vehicles discussed here are listed in Major Lyon's thesis in Chapter IV starting on p. 44. Note: Major Lyon does not address the O-2 in this chapter, but similar data can be obtained from any later edition of Jane's, All the World's Aircraft.

9. The term "zoom" is usually used to describe any maneuver that uses the forward inertia of the aircraft plus its thrust to move rapidly from a lower altitude to a high altitude in a minimum amount of time. The higher the aircraft can "zoom", the more likely the maneuver will be useful to observe targets or avoid anti-aircraft.

10. TAC Project TR-71E-009S, "Combat Dragon - Final Report" Vol I, April 1968.

CHAPTER V

OBSERVATIONS

CONCLUSIONS AND RECOMMENDATIONS

This study has attempted to examine the capability of the forward air control portion of the Tactical Air Control System to provide required support in a postulated NATO-Warsaw Pact conflict.

The evolution of Soviet Air Defense System capability to a point of apparently complete invulnerability has led many USAF strike pilots and forward air controllers to conclude that no airborne FAC can do his job and survive in the European arena.

The present manning and equipment of the TACS is such as to lend credulance to that position. The equipment is aging, some to the point of reaching or exceeding planned life cycles. Authorized FAC positions measureably exceed the number of personnel available to fill them. The present system utilizes types of communications equipment and techniques which appear unworkable in a Soviet communications jamming environment.

On the surface, it appears the TACS and its forward air control function are not workable, or feasible, in the European theater.

The following observations, conclusions and recommendations are offered:

Observation

The capabilities of the Soviet Integrated Air Defense System (IADS), although formidable, have vulnerabilities and limitations which

can be exploited. Most discussions of the Soviet IADS address the system at its optimum. Little or no consideration is given to the affect of terrain variables, foliage, placement considerations relative to self defense, or how these factors degrade the system capabilities. These factors alone are enough to offer friendly airborne platforms "havens" or "relative safe areas" to move closer to the Forward Edge of the Battle (FEBA) and communicate.

Conclusion

The TFWC/SA study of Soviet IADS threat vulnerabilities, and the utilization of this basic knowledge during Red Flag and other exercises, indicates it is possible to exploit the enemy system enough to enable a fixed wing aircraft to transit to a forward position and communicate with a GFAC or helicopter Forward FAC on a regular, recurring basis.

Recommendation

The present intelligence system, which briefs and updates enemy threat capability should be revised to include vulnerabilities and limitations. The intelligence systems should provide AFACs with likely "safe areas" from terrain masking and system envelope limitations data. The AFACs should be given avenues, corridors and pockets of safety that correlate to the terrain. The AFACs could then operate and communicate with forward ground elements and strike flights by minimizing their exposure to the threat and moving to maximized communications positions.

Observation

The ground and air equipment used to transport the FAC to and from his areas of responsibility is either lacking or obsolete. In-

compatability between FAC equipment and a particular Army tactical operation can severely limit the effectiveness of Forward Air Control. Lack of imagination on the part of the FAC, and reluctance of the army commander to provide special purpose vehicles, will also limit the viability of the FAC.

Conclusion

Although much of the equipment available lacks the advantages of modern technology, a good knowledge and understanding of what is available can provide at least acceptable performance in most situations. Enough variety of equipment is available, and in sufficient quantities, to enable the USAF TACS forward air control team to provide the proper army Close Air Support when and where needed, for as long as the fighter sorties are available.

Recommendation

Both USAF and US army commanders and staffs should be educated to the requirement for flexibility and economy of force in the use of FAC transportation assets. Helicopter support must be dedicated to the FAC to enable rapid flexible movement of Forward FACs to CAS requirement areas. The USAF should have a concerted program to produce an interchangeable radio package for use in any given Army track, without special modification, that can be installed in minimum time and transferred again whenever necessary. Additionally, educate USAF and Army personnel to recognize the need for compatable Army-USAF vehicle crosscountry capability as the situation dictates.

USAF planners must recognize that, although the OV-10 has limitations, it is already in the field and should be utilized in the

most optimum manner. This includes utilizing the threat knowledge information mentioned earlier for survival and utilizing the different types of radios and positioning to combat communications jamming efforts. Crews should be trained to recognize techniques of cross-frequency radio usage, terrain masking techniques, repositioning for better line of sight and reduction of quantity of radio transmissions to enhance capabilities in any situation. Rather than trying to replace existing fixed wing assets with an expensive, highly advanced technology equipped aircraft, consideration should be given to upgrading the present fleet of OV-10s to the "D" model status. The additional power available should offset the single engine limitations and at the same time slightly increase the dash capability of the aircraft. The cost would be considerably under any proposed replacement.

Observation

The number of personnel available to handle the forward air control mission is considerably less than the number of positions to be filled.

Conclusion

As presently organized, most battalion sized units will not be afforded a full component of FAC personnel during any full scale conflict.

Recommendation

FAC personnel authorizations should be reorganized to place all FAC assets at the brigade level. This pool can be centrally allocated by the brigade commander, with the advice and consent of the brigade ALO, to the units requiring support. Army helicopter assets should be

utilized to afford relatively fast, versatile transportation and operating platforms for these Forward-FACs. Fixed wing FACs would remain assigned in Tactical Air Support Squadrons (TASS), maintaining the AFAC (or FAC Airborne FAC-A) role as their sole responsibility. Since the TASS would no longer provide battalion FACs, and the FACs in the field would no longer be required to cover both GFAC and AFAC roles, the force required would be effectively reduced. Present manning numbers could come much closer to fulfilling the required tasks.

Observation

The actual information relay and control of strike flights has changed with the advent of the NATO-Warsaw Pact scenario. Strike flight tactics now approximate the NATO standard of low-level ingress to a pop or low-level ingress and delivery. Old procedures and techniques not only do not work, but their long usage impairs implementation of change.

Conclusion

The NATO strike flight tactic requires complete mental regearing for every phase of Forward Air Control. Old perceptions of control and target designation must be mentally regeared to actualities. FAC target data acquisition, translation, and transfer must be accurate and timely. The interaction between the forward FAC, the AFAC (or FAC-A) and the strike flight must be one of complete understanding and teamwork.

Recommendation

Strike units and FAC units must become intimately familiar with each others capabilities and requirements. Briefing teams of FACs must

regularly refresh strike crews of their requirements and capabilities. The strike tactics and techniques of different, individual aircraft must be second nature to each FAC. All involved personnel must be aware of the other's radio capabilities, and how the data will be computed and passed. Precision planning and flying must be emphasized, and practiced constantly. Army commanders and their troops must know that precise targeting data and timely updates, provided to the FAC are their best means of insuring the most accurate close air support. Utilization of a hand-held computer such as the Texas Instruments TI-59 or TI-58 will provide a relatively inexpensive means to accurately translate the target data to usable, accurate information for the strike crews.

The recommendations given here have all been used in some form during unit training, Red Flag and other exercises. At no time have the techniques been integrated together, nor have they been endorsed by command headquarters. Air Force Manual 2-1 and Multi-Command Manual 3-1 both contain recent revisions that include some of the techniques recommended here. Formal testing of these tactics have been stymied by lack of funds. Remnants of interservice rivalries between the USAF and the US Army also crop up from time to time.

It is my general conclusion and recommendation that the presently equipped and manned system can be satisfactory in a European scenario.

The integration of the details outlined here, and in the references, backed by inter-service cooperation, can provide a solution to a problem frequently considered insoluable.

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